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SCAMMONY RESIN.

By Frank O. Taylor.

The literature to be found upon scammony resin is not very extensive, especially as regards analytical data, though during the past year several articles have appeared giving an account of analyses made and methods used both on genuine scammony resin and the false, or so called "Mexican" scammony. Such examinations as have been published have dealt largely with gross adulterations of the resin and have included chiefly determinations of moisture, ash, ether solubility and any particularly crude adulterants present. In the past year Cowie (*Pharm. Jour.* (4), 27, 365) has gone somewhat more into detail in the analytical characters of scammony resin.

During the last few years attention has been called to the presence on the market of a false scammony, passing under the name of "Mexican" scammony. E. M. Holmes (*Pharm. Jour.* (4), 18, 326) has commented upon the botanical character of this root and states that it is nothing more than *Ipomœa Orizabensis,* which has been known for years and is described in a number of reference works. At the same time H. Deane published a note upon the resin content of the root and some brief examination of its ash and solubility. It was found to be almost perfectly soluble in ether and had an ash of only 1.35 per cent. The yield of resin from this drug was, however, very much higher than that obtainable from the true scammony. This same false scammony has previously appeared under this and other names, but hardly to the extent that it has recently.

William Duncan has published (*Pharm. Jour.* (4) 26, 378) some tests made on Mexican scammony showing the yield to be from 16.5 per cent. to 20. per cent. and paying special attention to the melting point. More recently Cowie and Brander (*Pharm. Jour.* (4), 27, 366) have given results obtained in the examination of several samples of Mexican scammony.

In view of the above statements it was thought that a more comprehensive examination of a number of specimens of scammony resin would afford data of interest and value. For this purpose nine samples of resin were taken which had been carefully made from the crude drug. Number 9 was known to be a sample of the Mexican scammony; numbers 2 and 3 were expected to contain greater or less amounts of Mexican scammony intermingled with the true drug, while 1 and 8 were of uncertain origin though presumably from true scammony. The remaining samples were from genuine specimens of *Convolvulus Scammonia.* These were examined for moisture, ash, ether-soluble resin, acid value, saponification value, ester value and iodine value. Such data were available that it was also possible to determine the yield of resin from the drug used. The results obtained follow in tabular arrangement with such comments appended regarding the methods used and the conclusions to be formed as seem necessary.

No.	Yield	Per cent. moisture	Per cent. ash	Per cent. ether sol.	Acid value	Saponification value	Ester value	Iodine value
1	8.1	2.18	0.12	99.0	21.1	232.4	211.3	13.3
2	12.2	1.94	0.08	99.5	14.6	198.4	183.8	8.7
3	16.75	1.77	0.09	99.6	15.5	186.6	171.1	8.7
4	7.93	1.71	0.05	99.7	15.6	238.1	222.5	10.8
5	8.06	1.74	0.09	99.3	18.2	238.0	219.8	13.0
6	7.71	1.86	0.09	99.3	18.8	240.5	221.7	14.3
7	8.52	1.65	0.20	99.0	21.3	239.4	218.1	14.6
8	.....	2.09	0.15	98.8	14.5	232.8	218.3	10.5
9	16.83	2.03	0.22	96.5	21.5	187.1	165.6	11.5

Yield.—It will be seen that the Mexican scammony gives practically double the yield of the true drug. Deane obtained a yield of 18½ per cent. and thinks that 17 or 18 per cent. is higher than the usual yield, while the quantity obtained by Duncan has been referred to above. From samples 3 and 9 it would appear that 17 per cent. would scarcely be too high. Sample 2 cannot be considered as representing a lot which is entirely a Mexican scammony. Flückiger and Hanbury (*Pharmacographia,* 447) do not find so large an

amount of resin in this root, but it is quite possible that this is due to the quality on the market at the different times. The yield of the five samples of true scammony is very similar, ranging from 7.7 to 8.5 per cent., so that the drug which yields a very high percentage of resin may be looked upon as one containing false scammony. Regarding the physiological action of the resin from these two varieties of drug it is not in my province to speak, in view of the fact that this work was wholly upon the chemical characteristics of the resin.

Moisture.—This was determined by carefully weighing off 2 grammes of the powdered resin into a tared crucible and heating at 100° C. for six hours. Incidentally it may be remarked that it is preferable not to have the resin too finely powdered; otherwise, as it electrifies with much ease, it is difficult to properly weigh and effect its transfer from the watch-glass of the balance to the various containers used. The idea in weighing it into a crucible is that the same sample may subsequently be used for the determination of the ash. The amount of moisture found was somewhat less than has been found by a number of observers, but was nevertheless about what might have been expected in a carefully prepared resin of this or other description.

Ash.—The ash was determined by simple ignition of the resin previously used for determination of moisture. A very great discrepancy is to be noted between the amount of ash found in these samples and the amount of ash as recorded by some other experimenters. In " Notes on Ash Yield of Crude Drugs " by Chattaway and Moor (*Analyst,* 1903, 202) about 6 per cent. is given as the amount of ash found in scammony resin. In the same article quotations on the amount of resin-ash are made from Moor and Priest, they finding 7.9, 4.9 and 6.1 per cent. in three samples. J. Barclay is also quoted as finding 3.4 per cent. ash in a sample. The amounts of ash here found, none of which exceed 0.22 per cent., are therefore indicative of excellent samples of resin, and these agree well with the results obtained by Cowie and by Cowie and Brander. An ash so low as that of number 4 (0.05 per cent.) can be considered as negligible as regards its effects upon the purity of the resin.

Ether Solubility.—This was determined by treating 5 grammes of the powdered resin with 100 c.c. of ether (using the U. S. P. quality), letting stand in a tightly stoppered flask with occasional shaking until the resin was wholly dissolved, or preferably over

night, then filtering through a tared filter, washing filter and residue carefully with ether, drying at 100° C., and weighing filter and residue. In this connection we may mention the process for the rapid determination of resin in scammony as published by E. Dowzard (*Pharm. Jour.* (4), 18, 469), in which he digests a weighed amount of drug or gum-resin scammony with ether, filters the ethereal solution through a dried filter and determines the resin by evaporating to dryness in a tared vessel an aliquot portion of this ethereal solution. This method differs from the one used by Cowie in the use of an aliquot part of the ethereal solution instead of the entire solution, thus being much more rapid. A correction is given for the increase in volume of the ether by reason of the dissolved resin. The chief objection to this method is that the solvent is so extremely volatile that in filtering and measuring off the aliquot part, however rapidly this may be done, some loss must occur by reason of evaporation, rendering the solution therefore more concentrated. The method will undoubtedly work rapidly and for ordinary purposes will probably be sufficiently accurate. Whenever possible, it is therefore by all means preferable to use the method which we have suggested or the usual one of extraction by means of a Sohxlet apparatus. As was to be expected in a resin yielding so little ash, the ether solubility was correspondingly high. The conclusion is not to be drawn from this that low ash and high ether solubility are always to be found together in proportional percentages, but merely that from a resin containing but a trace of inorganic matter there has been removed a large portion of the matter which is ordinarily insoluble in ether. The sample of scammony resin (number 9) is the least soluble but still attains the high percentage of 96.5 ether-soluble resin. This is at variance with the results of Cowie and Brander, but agrees with those of some other observers.

Acid Value.—In the determination of the acid value the usual process for oils was followed, and, as was expected, considerable difficulty was experienced in determining the end point of the titration because of the dark colored solution. This difficulty was still further enhanced by the fact that the resin solution darkened very considerably on addition of alkali until it was with great difficulty that the final change in color of the indicator was observed. For the determination 2 grammes of resin were dissolved in a mixture of 50 c.c. each of alcohol and acetone. This was titrated at first with N/5 alcoholic soda, but it was found that the solution became

so dark that it was impossible to see the end point with much accuracy when so dilute a solution was used for titration. The quantity of indicator (which was the customarily employed phenolphthalein) had to be larger than ordinary, not being less than 10 drops. Finding that the N/5 solution used did not work so well as could be desired, recourse was had to N/2 alcoholic potash. With this the determinations were finally carried out with a greater degree of accuracy, at least in the observation of the quantity of solution used for titration. There was, of course, a consequent loss in accuracy through the use of the more concentrated solution, but this was more than compensated by the facts just mentioned; so that for all practical purposes the use of the N/2 alcoholic potash will be found preferable to a more dilute solution for use with this resin.

From the results obtained it appears that the acid value determination is of no importance in the distinguishing between true and false scammony resin. The lowest values found concord with the acid value of resin scammony recorded by Kremel as quoted by Dieterich (Analysis of Resins, 218), which was 14.6. The acid values as a whole show no wider variation than might be expected in samples of resin obtained entirely from true scammony root. The results obtained by Cowie are somewhat higher for genuine scammony and lower for Mexican scammony.

Saponification Value.—For the determination of the saponification value 1.5 grammes of the resin were treated with 25 c.c. of N/2 alcoholic potash and boiled gently for half an hour under a reflux condenser. In attempting then to determine the excess of the alkali by titration with N/2 hydrochloric acid it was found that with any reasonable amount of phenolphthalein it was in many cases absolutely impossible to see the end reaction. Furthermore, an additional difficulty arose in that in some cases the resin-soap produced was deposited in the bottom of the flask as a sticky mass which was insoluble in alcohol and all the other usual organic solvents and which occluded a considerable quantity of alkali. This rendered the end point indecisive as, after titrating to the disappearance of the red color of the phenolphthalein, when such disappearance could be observed, on standing, the solution again became alkaline from the dissolving of some of the occluded alkali. This is not a case of alkalinity produced by the hydrolysis of the resin-soap through the presence of the water introduced as N/2 hydrochloric acid, but is truly a case of occlusion. The difficulty of seeing the end point

could be overcome by dilution with alcohol, but this still leaves the second and greater difficulty as it was originally, hence it became necessary to use water as a diluent. This both decreased the darkness of the solution so that the end reaction might be fairly well observed and dissolved the resin-soap, bringing into solution for easy titration the occluded alkali. Some hydrolysis of the soap will undoubtedly occur, but this change proceeds slowly as is evidenced by the facts: (1) that the solution after neutralization does not again become alkaline in any reasonable length of time, and (2) that variation in the quantity of water used does not cause perceptible difference in the quantity of hydrochloric acid required for titration. In view of the above facts and to have uniformity in determinations, so that such errors as may be caused by the hydrolysis of the resin-soap will be as nearly uniform as possible, 100 c.c. of water were added to each saponification before titration.

The saponification values, as will be seen, are quite uniform and indicate that a sharp distinction may be drawn between resin from *Convolvulus Scammonia* and from the false or Mexican scammony, the former ranging around 238 and the latter a little below 190. Samples 4, 5, 6 and 7 were known to be true scammony resin as before stated; samples 3 and 9 are with equal certainty from Mexican scammony; sample number 2 is almost entirely Mexican scammony; while samples 1 and 8 appear to contain traces of Mexican scammony.

Kremel found a saponification value of 185.6 for a sample of resin scammony and 180.2 for one of Aleppo scammony (see Dieterich, Anal. of Resins, 218), but the purity of the resin as regards ash and ether solubility is not given with the results, so we can form no exact estimate of how these saponification numbers may compare with those here given.

Cowie obtained results quite similar to those I have obtained when working on genuine scammony, but there is a wide difference between the saponification values given by Cowie and Brander for Mexican scammony and those above recorded, and for which no reasonable explanation is apparent at this time.

Ester Value.—Little need be said regarding the ester value since it is nothing more than the difference between the saponification and the acid values, and as the acid values of the two varieties of resin are about the same, the ester value will vary as does the saponification value.

Iodine Value.—This determination was carried out by the method usually applied to oils, using 0.2 gramme of resin, dissolving in 15 c.c. of chloroform, adding 25 c.c. of Hubl's iodine solution and letting stand for four hours in a dark place. After this 300 c.c. of water were added and titration of excess iodine effected by N/10 thiosulphate. The iodine values found show that they form no means of distinguishing between the true and Mexican scammony resin, but are about the same for both varieties.

As a whole the work shows that a resin of very low ash and very high ether solubility may be obtained, whose chemical constants can be determined with a considerable degree of accuracy; further, that by the saponification value alone we may distinguish between the resin from *Convolvulus Scammonia* and that from *Ipomœa Orizabensis*. When it is necessary, it appears that we have in the saponification value a characteristic constant of both resins, which will enable us to distinguish them or detect any marked adulteration of the true resin with that of the false root.

From the Laboratories of
Parke, Davis & Co.

HISTORY OF THE MEDICINAL EARTHS AND OF CATAPLASMA KAOLINI.*

By Dr. Hermann Schelenz,
Cassel.

The history of remedies, especially such as nature gives us, those of animal, vegetable and mineral origin, teaches us that in olden times altogether, and later on very often they were discovered by the public through accident or through an unknown inward impulse —so-called instinct. Reflections of this kind gave us the teachings of "Signa Naturæ," "Contraria Contrariis" and "Similia Similibus."

Thus discovered by the people these medicines were tried and used and came in public favor, and if found to be of value they were then adopted by the medical school, used during a shorter or longer period, with more or less enthusiasm. These medicaments gradually were used less and less and at last were put aside and became obsolete. But after a while these forgotten remedies were *again* brought

* Translated by Otto Raubenheimer, Brooklyn.

to life by the public and also *again* came in honor and use by the medical school. This story of the origin of a remedy, its death and its resurrection, repeats itself time and time again. And for this reason the following motto taken from Horace:

Multa Renascentur, quae jam Cecidere; Cadentque, quae nunc sunt in Honore!

(Many things shall be brought to life which have fallen and many things which now are in honor shall fall.)

was placed on the front page of that first and most important and legal dispensatory of Valerius Cordus.

I might explain here that the young German scholar Valerius Cordus in 1543, on his way to Italy to quench his thirst for more knowledge, stopped in the old historical city of Nuremberg. When the Senate learned that Valerius Cordus, then only 26 years old, had carefully compiled a book containing all old and new medicinal preparations together with many improvements of his own, then the book was ordered printed and was published in September, 1564. This dispensatory was so complete that it created quite a sensation and besides the several Nuremberg editions there were those of Paris, Lyons, Venice and Antwerp. It was the first work which corresponded to the modern idea of a pharmacopœia and which received legal sanction in Europe, and it was a lasting monument to the learned and brilliant youth Valerius Cordus.

In the following historical sketch I shall endeavor to prove the truth of Horace's words in regards to the old Terræ or the argillaceous earths.

The medicinal properties of these earths (the technical properties are not considered in this paper) are entirely or at least principally due to their alumina or aluminum silicate content.

Dioscorides, that most important author, whose works on modern materia medica and pharmacology were authoritative down to the 16th century, in V. 122, teaches that alum, the "stypteria," possesses healing and astringent properties, that it cures boils and carbuncles, leprosy, itching, frost-bites, and, when mixed together with peameal and tar, it cures scurf and scabs.

He also describes the different Terræ from Eretria, Samos, Chios, Kimolos, Melos and Selinus as being used for the same purpose. He states that the Earth of Samos gives an excellent powder for the absorption of perspiration, as for instance in the armpits, and is also used against snake-bites.

The Earth of Samos, according to Dioscorides, rubbed together with rose water and rose ointment (just notice how old our Ung. Aq. Rosæ is) helps against inflamed breasts and also against inflamed testicles. The Earth of Chios smoothens the face and the entire skin, the Earth of Kimolos helps against erysipelas, etc.

By accident it was discovered that the above natural products possess cooling, astringent, absorbent and preserving properties. The reputation of the works of Dioscorides, which contain all, even the principal remedies of to-day, also helped to popularize the different earths as remedies and effective remedies against all skin diseases.

In ancient times the following two forms of medicines were used extensively.

1. The Sphragis Pastilles (sphragis—seal), originated by the Greek physician Polyiadas, composed of Alum, Myrrh, Iron Vitriol, Ox-gall and the blood of goats, and on account of the latter ingredient they were stamped with the emblem or image of a goat. This incident, by the way, may be considered as the origin of the trademark.

2. The Terra Lemnia, from the island Lemnos, the preparation of which was studied by the great Roman physician-pharmacist, Claudius Galenus, who travelled purposely to that island. This earth contained besides aluminum and iron silicates also more or less magnesium silicate. Prospero Alpino in his work "De plantis Ægypti," Venice, 1592, states that at that time a substitute was sold in place of Terra Lemnia, the so-called Boabab Pulpa prepared from the fruit of Adansonia digitata.

Aulus Cornelius Celsus, the learned Roman physician, the Cicero of Medicine (Medicinæ Cicero) uses and describes different earths in his works. In fact every nation and even every place praises *their* earth as the very best.

In my "History of Pharmacy" I pointed out that the great North Persian physician, Abu Mansur Muwaffak, in his "Liber fundamentorum pharmacologiæ" (Book of the Principles of Pharmacology), the oldest Persian book of pharmaceutics, among the 584 remedies describes several earths, Terra Cimoliæ, etc. (Terra or Pulvis Cimoliæ is even to-day used as a synonym for our Fuller's Earth).

But not only *externally* were these earths used in olden times, but also *locally* and even *internally*. They were said to help against snake-bites inasmuch as when pressed upon, or in powder form sprinkled upon the fresh bite, they absorb the blood and possibly

also absorb and destroy the poison. Alum used locally was, and even to-day is, said to prevent conception. Thus these earths got the general reputation of being remedies against poisons and also against plague or contagious diseases. The ancients even went so far that the dishes and vessels burned from these clays and earths—the ceramic art has been known from the oldest times, the Chinese being noted for their porcelain and the Egyptians and Greeks for their pottery—were said to possess also medicinal properties, inasmuch as they transferred the magic power to the liquid kept therein.

Red clays also were very popular. Bolus Rubra, red bole, Bolus Armena, Armenian Bole, natural aluminum silicate containing iron oxide, was especially renowned as a remedy against plague. Bol d'Arménie has even been official in the Pharmacopée Française up to 1908 and was one of the ingredients of Emplâtre Céroène (Emplastrum Ceroneum). The red earths were also marketed in the form of disks or lozenges imprinted with a seal, as Terra Sigillata rubra.

In place of the foreign and oftentimes adulterated earths, domestic clays were found to be equally as effective.

In Laubach, Hessia, for instance, Andreas Berthold von Oschatz discovered a pipe clay which was found to be valuable, and he wrote with silver on blue parchment paper an essay to the Hessian Court. The earth according to the fantastic custom of that time was called "Axungia Solis" (more correctly would be "Soli") or "Earth Fat" on account of its fatty nature. Similar earths were found near Striegau, Silesia, others in Saxony called Steinmark, Medulla Saxorum, or Saxon Wonderearth, Terra Miraculosa, used for sympathetic cures. The white earths were also marketed in the shape of balls, disks or troches and imprinted with a seal under the name of Terra Sigillata alba.

In the museum of Olaus Wormius, Leyden, 1606, were about 25 different kinds of Terræ, among them also Kaolin or China Clay, the purest natural aluminum silicate. The name Kaolin is derived from the peninsula Kaoli in Korea, or according to such an authority as *Wittstein Etymologisch-Chemisch Handworterbuch* from the Chinese Ka-olin, which, according to Muspratt's *Technisch Chemie* is the name of a mountain, situated east of King-te-chin, where porcelain clay, the product of decomposed feldspar, is found abundantly.

The more the composition of the different earths became known, and the more medicine wanted to use the pure active principle, the

quintessence of the various drugs, the more the variable and sometimes adulterated clays, earths and boles became obsolete and purer aluminum preparations came into use and became official.

Argilla alba or Bolus alba of the Pharmacopœias was chiefly used as a pill excipient, especially for deliquescent or easily decomposed salts. However, through the many family receipts, handed down for centuries, the laity kept on using the different earths for inward troubles, such as diarrhœa and dysentery, as well as external applications in the form of clay poultices or of dry powder, as for instance, against bee stings, ulcers and sores, salt rheum and eczema, and all kinds of inflammations.

Therefore the apothecary had to keep in touch with the different earths. Meanwhile the medical profession has found out that the quintessence, the active principle of drugs, as, for instance, quinine and morphine, does not act exactly the same as cinchona and opium, the drug itself; the medical profession has found out that the artificial mineral waters are not quite as valuable as the natural waters direct at the spring, and has also found out that alumina or aluminum hydroxide cannot replace the old "Terræ."

Let me give you another example which confirms the motto of Horace cited in the beginning:

The well known virtue of vegetable drugs, well known and tried for centuries, was in the course of time ridiculed and forgotten. Medical science enthusiastically used mineral poisons, coal-tar and aniline derivatives and synthetic chemicals for a while, until to their sorrow they discovered *bad* effects resulting from their use. Then again they took hold of the remedies of old, the herbs, roots, etc., and preparations therefrom.

And the Cataplasma Kaolini of the U. S. P. VIII indicates such a return to the old materia medica. In this cataplasm we find the old kaolin in combination with Glycerin, Boric Acid, Thymol, Methylsalicylate and Oil of Peppermint, essential principles or quintessences of such old time remedies as Borax, the ancient Chrysocolla (from chrysos—gold—and kolla—glue) used for soldering by the ancients, and the quintessences of Thyme, of Spirea ulmaria and of Mentha. Glycerin, the old "Oelsuess" accidentally discovered in 1783 by the zealous Swedish pharmacist Karl Wilhelm Scheele as a by-product in the preparation of Emplastrum Plumbi, evidently is added to this cataplasm in order to keep it soft, and also by its hygroscopic power to act as a mild counterirritant and exosmotic.

This is not the first instance in which a preparation has been forced to enter a Pharmacopœia to be recognized as an official remedy. The admission of Extractum Malti into the German Pharmacopœia came about through Hoff's Malt Extract; and the different specialties, which have sprung up of late years and were advertised and pushed with truly American ingenuity very likely made a way for the introduction of Cataplasma Kaolini into the U. S. P., *which book is without doubt the aristocrat among all the Pharmacopœias.*

This U. S. P. formula has since been adopted by the Ontario College of Pharmacy in their Canadian Formulary, 1908, and the Pharmaceutical Society of Great Britain in their British Pharmaceutical Codex, 1907, which must indeed be very flattering to the U. S. P. Revision Committee.

But the claim of the manufacturers of the various specialties with the fantastic trade-mark names that their preparations are original is a mistaken idea, or, plainly spoken, is false, as I have proven in the foregoing that clay poultices have been used from the oldest times.

Their fantastic names, but *not* their preparations, are original!

In Germany preparations of this kind have been known and used for a long time. The great pharmacist Hager in his "Pharmazeutische Praxis" gives a formula for Pasta Boli albæ, and the manufacturing pharmacist Dieterich in his "Manuale" gives formulæ for "Pasta Kaolini glycerinata" and "Pasta Kaolini oleosa."

Thus you can see that by the resurrection of this old earth and paste, by the admission of Kaolin and Cataplasm of Kaolin in the U. S. P. VIII, the words of Horace again become true. Let us hope that the old clay poultice in its new, somewhat mysterious form, will have a long and blissful life in our materia medica!

It is a proven fact, which does *not* correspond with the old saying that "humanity changes in time," a fact which is deplorable for modern civilization and educated mankind, that earth or still better ordinary clay, which has been used from times immemorial against inflammations, is to-day regarded and used as a remedy for *almost every known disease* by a newly formed school, originated *not* by a physician but by Pastor Kneipp!

Multa Renascentur quae jam Cecidere!

(Many things shall be brought to life which have fallen.)

PRACTICAL SUGGESTIONS FOR THE IMPROVEMENT OF U. S. P. ASSAY METHODS.*

By John G. Roberts.

The subject which has been selected for this article has perhaps been pretty thoroughly discussed, but in practical every-day work we find that there are some points in the U. S. Pharmacopœia which could be improved upon. Of the excellence of the Pharmacopœia there is no doubt, as it stands at the front of all works of its kind. In its growth, from decade to decade, it has steadily increased in value, particularly to the pharmacist, as a reference book, as a guide to the manufacture of the most important pharmaceutical preparations, for the identification of crude drugs and for the detection of adulterations in chemicals, and fixed and volatile oils. It has set standards for vegetable drugs and their preparations, chemicals and oils, presents methods for the determination of their strength, and tests for their purity.

In fact, it is of great importance to the pharmacist, as it is a source of protection; for when he orders a preparation specified in the Pharmacopœia, he is assured of obtaining a preparation of known strength and purity. This is especially true since the passage of the Food and Drugs Act, by which act the Government recognized it as an authority. The Pharmacopœia may be somewhat stringent on some points, but in the large majority of cases it is perfectly fair and exerts an uplifting influence upon the pharmaceutical profession.

As the Pharmacopœia is final on all questions concerning the preparations which it specifies, it should be perfectly clear and intelligible on all points to those who must use it. While it is generally satisfactory, there are some points which need revision, some which should be made more comprehensive, and still some others which should be inserted. A few points which have been omitted are of sufficient importance to command attention.

Probably the most important subject treated by the Pharmacopœia is the determination of the alkaloidal strength of drugs, fluidextracts, extracts and tinctures. It is entirely proper that they should receive considerable attention, as the alkaloidal content is extremely important.

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* Read at the meeting of the Philadelphia Branch of the American Pharmaceutical Association, January 5, 1909.

On pages 578 and 579, Chapter IV of the Appendix, the Pharmacopœia gives instructions concerning alkaloidal assay by immiscible solvents, but it is not complete, as some of the most essential points in alkaloidal assay have been omitted. This chapter explains the process and what takes place at certain stages of the assay; for instance, it states what is formed upon shaking out with a dilute acid solution, describes a separator, tells how to break up emulsions, and states that the ethereal layer is above the aqueous layer in the separator. This is necessary, as no effort should be spared that would be of value to those who must, of necessity, use the U. S. P. methods for the determination of alkaloidal strength. In the treatment of this subject probably the most important part of an alkaloidal assay, and one which may cause an error in the result, has not been touched upon, and that is the necessity of washing the tip of the separator stem with some of the solvent. This must be done because when the ether or chloroform containing the alkaloid is drawn off, some is drawn up around the outside of the stem, from which it is evaporated, leaving the alkaloid, and if this is not washed off it will be a cause of error in the result. It is more likely to occur with ethereal than with chloroformic solutions.

Another factor in alkaloidal assay, and one which is of sufficient importance to deserve mention in the chapter under discussion, is the absolute necessity of excluding any acid or ammonia fumes from the room. It is not necessary to do this during the whole of the operation, but only after the time the ethereal or chloroformic solution is drawn off into the vessel in which the alkaloid is to be titrated. There are no reasons why these suggestions should not be incorporated in this chapter. It would be establishing no precedent, and they are of vastly more importance to the operator and are more conducive to accurate work than the knowledge that a salt is formed when the alkaloid is shaken out with dilute acids, or even how to break up an emulsion.

For the titration of alkaloids the Pharmacopœia instructs (with the exception where iodo-eosin is used as an indicator) that the solution be drawn into and the evaporation be performed in a beaker, but we have found that white, glazed porcelain dishes are superior for this purpose. In these dishes the evaporation of the solvent is more readily accomplished on account of the larger surface exposed. The end reaction is also more easily detected because of the white background. This is particularly true when cochineal is used as an indicator.

While discussing the assay methods of the Pharmacopœia, it would not be out of place to mention two methods which we have found very effective in breaking up emulsions. These are not offered for insertion in the Pharmacopœia, as the methods given there are satisfactory, but are recommended as being superior to the U. S. P. methods.

The first of these, which has been used to break up the most stubborn emulsions in a very short time, consists in treating the emulsified solution, if acid, with an alkali (preferably ammonia), or if the emulsified solution is alkaline, by treating it with dilute sulphuric acid. The reason for the disintegration of the emulsion is that the acid and alkali combine, or *vice versa,* thus forming a salt and liberating the solvent. When this is accomplished, it is brought to its original condition and again shaken out.

The other method is merely a mechanical one, and is not quite so effective, but may be used in less compact emulsions. It is performed by placing a dozen or so of small pieces of glass rod, about one-quarter inch in length, in the separator containing the emulsion, then holding the separator in a horizontal position and rotating slowly. By this means the emulsion is broken by coming in contact with the glass rods. The clear solution may then be drawn off and the operation repeated until the emulsion is completely broken up.

A decided improvement could be made in the assay methods of drugs like belladonna, hyoscyamus and stramonium, which require maceration and percolation, if both operations were conducted in one vessel. This would eliminate loss in transferring and would save time. A suitable apparatus should be described and recommended.

The question of economy in the assay of tinctures, fluidextracts, etc., must be considered. While this is not of much importance to the large manufacturer, it is to the small manufacturer, who would, perhaps, make only a pint of fluidextract and two or three pints of tincture. In practically all cases in the assay of tinctures, the U. S. P. instructions are to use 100 c.c. This is done regardless of the alkaloidal content. There is no necessity, in most cases, for using such a large quantity, as half the amount would be ample. Besides the waste of 50 c.c. of tincture, there is a loss of time in the evaporation which most of them require. If a duplicate assay is made (which should be made, in order to be reasonably sure of results), the loss would amount to 100 c.c. The reason for using such a large quantity is not because a smaller quantity would not

give accurate results, on account of the small amount of alkaloid present, as the same quantity (100 c.c.) is required to be used, whether the standard for the alkaloid in 100 c.c. is 0.014 Gm. or 0.1 Gm.

For an illustration, we will take the assay methods for tincture of nux vomica and for tincture of physostigma. The standard for alkaloid in 100 c.c. of tincture of nux vomica is over seven times as high as that for tincture of physostigma, but the same amount of tincture is required in both cases. When it is taken into account that the alkaloid which is titrated from the nux vomica represents the full 100 c.c., and the alkaloid from the physostigma only 50 c.c., the difference is even greater.

A more forcible illustration of this difference is found between tincture of hyoscyamus, which has a standard for 100 c.c. of 0.007 Gm. and tincture of hydrastis, which has a standard of 0.4 Gm. in 100 c.c. There is no reason why it would not be as well to use 25 c.c. in the case of both tincture of nux vomica and tincture of hydrastis, as it would be a saving of both time and material. There are several other cases which might be mentioned.

In a work of the standing of the Pharmacopœia, it should be the aim to eliminate all waste and to make all methods as short as possible. A sample of needless waste is found in the assays for colchicum corm and colchicum seed, in which we are instructed to take 100 c.c. of a mixture of ether 77 c.c., chloroform 25 c.c., and alcohol 8 c.c., amounting to a little over 109 c.c., allowing for contraction. Here we have an excess of 9 c.c., and if a duplicate is made, an excess of 18 c.c., which is wasted. It should be calculated so that it would only be necessary to make 100 c.c., as is done in most other instances.

The present methods for the assay of alkaloidal drugs and their preparations are, on the whole, very satisfactory, but we come across details, here and there, which require slight changes and which would give more accurate results. The first of these, which might be mentioned, is in the assay of opium. After drying the crystals of morphine obtained, we are told to weigh them on a tared watch-glass, after which they are transferred to an Erlenmeyer flask. It is not an easy matter to transfer a powder to a flask, as there is danger of loss by a portion dropping on the outside. A better method is to weigh the crystals on tared oiled paper which is considerably easier to handle.

In the assay of nux vomica the most difficult part of the operation is the oxidation of the brucine. We find, when making duplicate assays, that both solutions often do not act uniformly, as one is usually completed before the other; at times the oxidation is incomplete at the expiration of the ten minutes allowed for it. The trouble seems to be in the *temperature* of the solution, as it has been shown that if it is slightly warm an immediate oxidation occurs, producing a bright red solution. In view of this fact it would be of great benefit if the temperature, at which the oxidation is to be conducted, should be stated.

No matter at what temperature it is conducted, decrepitation usually occurs in evaporating off the solvent, which is likely to cause some of the alkaloid to be ejected from the flask. If the flask is rotated while evaporating the last portion of the solvent, this danger is minimized.

A condition similar to the one in the assay of colchicum corm and colchicum seed is found in the assay of conium, in which an excess of about 6 c.c. of menstruum is required to be prepared. While there is not as much waste in this case, nevertheless it must be considered as such, because there is more menstruum than is necessary for the operation.

The assay of pepsin is facilitated if the egg albumin be passed while hot through the sieve. This part of the method should contain the instructions to sieve the albumin *as soon as it has been boiled.*

A source of error is introduced into the method for the assay of physostigma, when it neglects to require the cylinder, in which the ethereal solution containing the alkaloid has been measured, to be rinsed with some of the solvent. It is true that the error would be slight, but an accumulation of errors, such as this, would cause a serious discrepancy in the final result.

If these suggestions were adopted, they would increase the volume of the Pharmacopœia to but a very small extent, but they would contribute much to greater accuracy in work, which is the *main* factor in alkaloidal assaying.

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SOME LABORATORY NOTES ON ASSAY WORK.*

By L. Henry Bernegau.

It is not my purpose this evening to give any new processes for the assay of drugs or preparations made from them. What I wish to give is only a few points in carrying out some assay methods, which would perhaps be of benefit to those in the pharmaceutical profession who *wish to* or *have to* assay their own drugs or preparations, that *should be* assayed.

In the assay of aconite root and preparations made therefrom we find it preferable to use for extracting the alkaloid an ether-chloroform mixture (100 c.c. ether, 21 c.c. chloroform) to which has been added about 15 c.c. of saturated sodium bicarbonate solution, instead of a proper amount of ammonia water. In carrying out the titration we find iodeosin to be of no value as an indicator, and now use only cochineal T. S. as indicator, as directed by the U. S. P., which gives very good results. Aconitine seems to be most stable, or to remain as such in those preparations having the form of a tincture or fluid-extract, that is to say, in presence of a high percentage of alcohol. Our records during 1908 show plainly that the powdered and solid extracts deteriorate much more quickly than preparations containing alcohol. On shaking out aconite and its preparations, very often a thick emulsion results. As quick work in my opinion is a great factor in getting good results, I carry out the assay as follows: After shaking the drug (say 12 Gm.) with 100 c.c. ether, 21 c.c. chloroform and 12 to 15 c.c. saturated sodium bicarbonate solution for about four hours, I filter off an aliquot part of the ethereal liquid, say 60 c.c. equivalent to 6 Gm. of drug.

The clear filtrate, removed to a separatory funnel, is shaken out at least three to four times with 1 per cent. sulphuric acid, 50, 40 and 30 c.c. respectively. On shaking vigorously an emulsion results in most cases, which is very difficult to separate. Now, I personally do not wait until a complete separation takes place, but let the partly separated lower layer run into a second separator. I repeat this same manipulation three or four times, which procedure does away with the emulsion in the upper part of the separator. Now shake the combined acid solutions (containing also froth, some ether and

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chloroform) very vigorously and it will be found that an almost complete separation results in a few seconds; allow the liquid to stand for one minute or so, as necessary, and collect the acid solution in another separator. Shake the froth and ethereal layer with 30–40 c.c. more of 1 per cent. H_2SO_4, let the liquids separate, which now takes only one-half minute or so, and add the acid layer to the other combined acid solutions and finish the assay according to the U. S. P. method.

It is not my intention to criticize any U. S. P. methods, but I would say, that the amounts of solvents for alkaloidal assays given in this valuable book are in most cases far too small to exhaust the drugs thoroughly; furthermore, in using small amounts of solvents or diluents the danger of getting emulsions increases. Conium fruit and its preparations are especially liable to form emulsions and on account of their high volatility, it requires skilful and quick work to avoid any loss. If treated as outlined under aconite there will be no trouble in effecting separation of the liquids, and the quick work will not allow an appreciable loss of coniine.

To make a reliable assay of any drug is not so very easy, as most or all of us know. We need not only practice and skilful hands, but also brains, and by no means least of all common sense. Every little detail requires different treatment. I find some drug analysts who are satisfied if the results obtained with duplicate assays fall within fair limits. As they mostly make these duplicates at the *same* time we must expect that they get the same results under the *same* conditions.

It is certainly and undoubtedly a good check to have duplicates made, but the results of these duplicates if identical or nearly so do in no way give a guaranty that they are right. I had to make up some years ago a solution of a mydriatic alkaloid of known strength in an alcoholic indifferent fluidextract and gave portions of this entirely uniform preparation to eight different analysts at eight different places for assay with the request to hurry these assays, to avoid any possible deterioration. In about five or eight days I received all their results, most of them written on nicely filled out blanks.

From three men whom I knew to be reliable, I expected close results and I got them; the five others were all too low, ranging from 80 per cent. down to 22 per cent. of alkaloids present, except one sample which ran 160 per cent. As every one of these analysts said duplicates were made by them, these duplicates did certainly not prove the correctness of their assays.

During the last year we found some lots of sanguinarine nitrate to contain a considerable amount of aniline colors, and at the same time to assay extremely low; one sample assayed only 52 per cent. pure sanguinarine nitrate. With the exception of a small amount of moisture, the remainder consisted mainly of some potassium nitrate and sugar of milk. As the U. S. P. requires no assay of sanguinarine and its preparations it would be of no great interest to the pharmacist at present to go into further details.

Gelsemium is another drug for which no assay is required by the U. S. P., but as this drug is employed now quite extensively it seems to be worth while to say a few words in regard to its assay. In our laboratories we assay this drug and preparations derived therefrom chemically as well as physiologically. Shaken out by the old-style method, the gelsemine mostly contains a large amount of highly colored foreign matter, which makes a gravimetric determination nearly impossible, while the coloring matter interferes with the volumetric end reaction. We did not have any difficulty in getting rid of the coloring matter by precipitation with solution of lead subacetate followed by dried and powdered sodium phosphate or sulphate, and were satisfied with the results in comparison with those obtained by other reliable methods. Only lately, we also tried Webster's method (tartaric acid) modified by Sayre and got good results on comparison.

The assays made by the latter method came out a trifle higher than those made by our own method. The main advantage of the new method lies in the fact that the recovered alkaloid has a much lighter color than that recovered by the old methods, and therefore the alkaloidal residue is easily titrated, using either iodeosin or cochineal as indicator. We are now using the Webster-Sayre method exclusively.

On assaying physostigma preparations, we employ both the gravimetric and volumetric methods as a check. If the assays are carried out *lege artis* both will compare favorably. If the alkaloidal residue is brown or dark colored the gravimetric method will give in most cases results which are much too high; on the other hand, it is very difficult to get a sharp end reaction with iodeosin, etc., as indicators, if the acid solution of the alkaloid is highly colored. If both assays compare well we are certainly satisfied; if not, we make these assays over until good results are obtained. As physostigma deteriorates very rapidly, even more so on exposure to light, air and

heat, its preparations should be assayed at least every three or four months before using them.

The U. S. P. directs to use for hyoscyamus assays 25 Gm. of the drug; 50 c.c. of the fluidextract; 10 Gm. of solid extract, but only 100 c.c. for tincture—why, I do not understand.

To make plain what I have in mind I hereby give the following comparisons:

25 Gm. of drug of 0.08 U. S. P. standard would represent 0.020 Gm. alkaloid.

50 c.c. of Fluidextract of 0.075 per cent. U. S. P. standard would represent about 0.0375 Gm. alkaloid.

10 Gm. of solid extract of 0.3 per cent. U. S. P. standard would represent 0.030 Gm. alkaloid.

100 c.c. of tincture of 0.007 per cent. U. S. P. standard would represent only 0.007 Gm. alkaloid.

Therefore the amount used for tincture is only about one-third of that used for the drug, about one-fifth of that for fluidextract, and about one-fourth of that for solid extract.

I think it advisable to use at least 200 c.c. of tincture for assay to get nearly accurate results, the amount of 100 c.c. being too small for practical laboratory work.

Personally I would say that I prefer iodeosin to cochineal in titrating all mydriatic alkaloids.

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RECENT DEVELOPMENTS IN ALKALOIDAL ASSAYING *

BY JOSEPH L TURNER.

If we cast a retrospective view upon investigations of vegetable drugs, two distinct purposes of these investigations can be noticed: firstly, the purely chemical investigations of drugs in order to learn the innermost of their composition and constitution, and, secondly, investigation of their practical application. While the first purpose is not yet entirely achieved and very much has yet to be done, how-

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ever, enough has been done to enable us to say that we have arrived at a certain point in the investigation of practical application of drugs where we can see that the things have cleared themselves in so far that we can ask ourselves whether it is not the proper time to combine the purely chemical and scientific investigation with the practical application and draw some conclusion as to the line of work to be carried on in the future.

Boulanger-Dausse in *Bulletin des Sciences Pharm.*, No. 1, 1908, pays particular attention to this question and comes to the following conclusions:

The endeavor to isolate the "alkaloid" to which scentific pharmacy paid such vivid attention for nearly one hundred years begins to lose its practical significance. The chemistry of colloids partly takes its place and the chemist and pharmacologist pay more and more attention to certain complex ingredients of drugs, or, as they are usually called, "extractives" of drugs.

A diligent and successful investigation of certain drugs showed conclusively that the active principles isolated from them in the course of one hundred years and studied both chemically and pharmacologically did not satisfy the requirements which the physician had right to put to them. Cinchona, digitalis, ergot, rhubarb, buckthorn, cascara sagrada, kola, opium, and nux vomica are the best examples illustrating what was said before.

Many prominent pharmaceutic chemists and, lately, especially Kunz-Krause, recognized this in proper time and showed that in many cases the production of chemically pure active principles of drugs can no longer be the ultimate purpose of pharmacy. It is more proper to expect that in the future pharmaceutical science will direct its work toward production of chemically unchanged colloidal drug preparations which will have the *total* action of the respective drug. Pharmacy will no longer endeavor to produce extracts under conditions favoring the furthest decomposition of the pharmacologically important constituents of the drug, but it will pay strictest attention to the results of the latest investigations on active ferments of the drug in order to prepare extracts and tinctures in the course of production of which chemical agents and active menstrua (for instance, alcohol) are avoided.

As soon as we agree which tissues of the drug contain the respective active principles and whether these active principles occur in the crystalline state or suspended in colloidal state, it will not be

difficult to find the means for their extraction. No doubt among these means dialysis will play an important part. In most of the cases attention will be paid to proper selection of the menstruum. In any case, as Boulanger-Dausse points out, the time has arrived to return from the purely chemical treatment of the drug to the pharmaceutic technical treatment on scientific bases; thus a way for a co-operation between the physician and druggist opens itself and it is impossible to foresee the benefit to the science of such co-operation.

Returning to the proper scope of my paper "Development in Alkaloidal Assay," I must say that the year 1908 was not particularly rich in progress along this line. While in the year 1907 a new precipitant for alkaloids was offered (Picrolonic Acid) and there was quite a discussion on certain U. S. P. alkaloidal processes, in the course of which a good many important improvements were suggested, during the last year no new methods for isolation of alkaloids were suggested, neither important improvements in alkaloidal processes were published, although some minor points were brought out.

Fluidextracts of Belladonna and Hyoscyamus.—Shortly after the appearance of the Fourth Edition of the German Pharmacopœia, E. Merck drew attention to the fact that the method of the Pharmacopœia for these extracts gave results which were 20 to 50 per cent. too high. It could be proven experimentally that the reason for these high results were certain volatile bases which were not driven off in evaporating the chloroform extract to half volume. As it was not advisable to evaporate the chloroform solution of alkaloids to dryness on account of decomposition of chloroform with formation of hydrochloric acid, Merck suggested the use of ether instead of chloroform and evaporating this to dryness. E. Rupp had occasion to verify Merck's work and found, in accordance with the latter, that the method of the German Pharmacopœia did not give concordant results, the alkaloidal content of the drug estimated by this method being sometimes twice as high as that found by Merck's modified process. The new Swiss Pharmacopœia does not consider the evaporation of the ethereal extract to dryness sufficient and requires that the residue of the ethereal extraction should be dissolved in 5 c.c. of ether and evaporated again, and this solution and evaporation should be repeated twice. Rupp assayed a certain extract by the three different methods and obtained the following results:

German Pharmacopœia process.....0.9 –1.1 per cent.
E. Merck's modified process.....0.62–0.7 per cent.
Swiss Pharmacopœia process.....0.57–0.61 per cent.

Therefore, it is evident that the repeated solution in ether and re-evaporation of the alkaloidal residue will free this residue from a certain amount of volatile basic substances, and Rupp considers that a true amount of alkaloids can be estimated only by the Swiss Pharmacopœia method.

The United States Pharmacopœia evidently recognized the importance of driving off these volatile bases, as it requires in the case of belladonna leaves and extract of belladonna the dissolving of the residue of the chloroform extract of the alkaloids in 3 c.c. of ether and subsequent evaporation of this solution. However, this method is not followed all the way through, as in case of fluidextract of belladonna and fluidextract of hyoscyamus no such requirements exist. It would be interesting to compare results obtained by the Pharmacopœia method with those obtained by an ethereal extraction of alkaloids and also by redissolving the alkaloids obtained by the U. S. P. process in ether and evaporating this solution, repeating this dissolving and evaporation twice as required by the Swiss Pharmacopœia.

Ribaut (*Bulletin des Science Pharmacolog.*, 1908, No. 9) investigated the decomposition of alkaloids in four-year old extracts of solanaceæ. The loss of alkaloids expressed in percentage of the original alkaloidal contents of the extracts is as follows:

Extract belladonna leaves..... 3
" " " 45
" " " 22
" " " 3
Extract hyoscyamus leaves.....69
Extract stramonium leaves.....31
" " " 8
Extract belladonna root..... 4
" " " 3
" " " 1
" " " 12
Extract hyoscyamus seeds.....19
" " " 25
" " " 24

The author ascribes the change in alkaloidal contents to biological processes (possibly action of certain bacteria), but does not think that it is in any way due to a chemical process.

Fluidextract Hydrastis.—Kollo recommends the following methods for the estimation of the hydrastine contents by means of titration with Meyer's reagent. A standard Meyer's reagent is prepared as follows:

13.546 Gm. $HgCl_2$ and 49.8 Gm. potassium iodide (after drying for twelve hours in desiccator) are dissolved in a little hot distilled water and after cooling to 15° C. are diluted to one litre; 1 c.c. of this solution precipitates according to Kollo 0.0223 Gm. hydrastine. The estimation is made in the following way: 20 c.c. of fluidextract are diluted to 100 c.c. with distilled water. Five test-tubes are filled each with 10 c.c. of this solution. To the first tube 1.5 c.c. of Meyer's reagent are added. The second received 1.6, third 1.7 and so on of this reagent. The test-tubes are shaken and the contents filtered. To one drop of each of the filtrates, one drop of a solution obtained by dilution of 20 drops of fluidextract hydrastis with 5 c.c. of water are added. The filtrate which first shows a cloudiness indicates that precipitation was complete in the respective solution. The amount in cubic centimetres of Meyer's reagent used is multiplied by 0.0223 and the product is multiplied by 50. The result gives the percentage of hydrastine, which is sufficiently exact for practical purposes.

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THE DETERMINATION OF ALCOHOL IN GALENICAL PREPARATIONS.*

By Charles E. Vanderkleed.

Aside from the economic and the occasional scientific interest in the subject of alcohol determination, the legal aspect of this subject since the passage of the Food and Drugs Act of June 30, 1906, has brought it into prominence, and the section of that Act which requires the accurate labelling of all medicinal substances entering into interstate commerce with their percentage of absolute alcohol by volume has rendered necessary the improvement of methods for the determination of the latter.

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Text-books on analytic methods are replete with directions for the determination of the alcoholic strength of fermented and distilled liquors. Here the problem is a comparatively simple one, inasmuch as alcohol is generally the only easily volatile substance present in amounts sufficient to merit consideration. Since alcohol does not readily lend itself directly to either gravimetric or volumetric methods of assay, nearly all determinations in the cases of wines, liquors, etc., have been based upon the influence of the alcohol present upon the specific gravity of the liquid. In some cases, where little else than alcohol and water is present, sufficiently accurate deductions as to alcoholic strength may be made by taking the specific gravity of the original liquid and referring to approved alcohol tables. In other cases, the difference in gravity before and after replacing all the contained alcohol with an equal volume of water is taken as the basis for calculation. Again, a given volume of the liquid may be distilled under proper conditions and the specific gravity of the distillate taken as the basis for the calculation.[1] The problem before us, therefore, is to see how these methods may be applied to galenical preparations, and what precautions and modifications it may be necessary to adopt in specific cases.[2]

In the first place, practically all galenical preparations contain appreciable amounts of dissolved substances, other than alcohol, which naturally affect their specific gravities. It follows, therefore, that the specific gravity of the original preparation will not directly indicate the alcoholic strength.

The second method mentioned, namely, that of taking the specific gravity before and after evaporation of the alcohol and restoring the original volume by adding water, is of limited application for the following reasons:

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[1] The method based upon the determination of the temperature of the vapors produced on boiling, involving the use of the ebullioscope, presents difficulties that render it inapplicable to practical every-day determinations, and will not be discussed in this paper. See Wiley's "Principles and Practice of Agricultural Analysis." The method involving the use of the immersion refractometer will be mentioned later on in the paper.

[2] Attention is here called to the fact that specific methods for the determination of alcohol in certain preparations have from time to time been worked out. Such, for example, is the method of Pearson for the estimation of alcohol in concentrated nitrous ether, published in the AMERICAN JOURNAL OF PHARMACY, Vol 80 (1908), page 101.

1. The method is not applicable where volatile substances other than alcohol are present.

2. The method is not applicable when the solution or residue left after evaporation of the alcohol is not perfectly soluble in an aqueous liquid, for the reason that the precipitation of dissolved matter caused by the change from alcoholic to aqueous menstruum produces an additional change in the specific gravity of the liquid. Alcohol being used largely in galenicals because its solvent action differs from that of water, it follows that a very large proportion of pharmaceutical preparations will precipitate when their alcohol is removed and will not yield a clear solution again on dilution with water. A method eliminating this difficulty is now being worked out in our laboratory, whereby it is hoped to increase greatly the availability of this method. This modification will be discussed later on in this paper.

We have left, therefore, only the third method, that of distillation, which must be adapted to use in pharmaceutic preparations.

Primarily, we have only two difficulties to surmount in applying the method by distillation to pharmaceutic preparations. The first and principal difficulty lies in the possible presence of volatile substances other than alcohol which would distil over with the latter and vitiate the specific gravity of the distillate. The second difficulty, which is a mechanical or physical one, consists in the liability of the solution to froth over, or to carry non-volatile matter mechanically over into the distillate.

Taking up first the greater difficulty, that caused by volatile substances other than alcohol, we can divide such substances into four classes as follows:

1. Volatile Acids.
2. Volatile Alkalies.
3. Volatile oils and aromatics.
4. Ethereal Solvents.

It is apparent, therefore, that a knowledge of the composition of the preparation is essential before a suitable method can be selected for determining its alcoholic content. Volatile oils, aromatics, ether and chloroform, can generally be detected at once by their odor, if present in amounts sufficient to vitiate an alcohol determination. The presence of volatile acids and alkalies must, however, be qualitatively determined, if the preparation is of unknown composition,

and not only must free volatile acids and free volatile alkali be guarded against, but their presence in form of neutral salts must be known. Thus ammonium chloride may readily vitiate a determination, since (as will be seen later) it is generally necessary to distil from an alkaline or an acid solution; and in the presence of ammonium chloride, the gravity of the distillate from alkaline solution would be vitiated by ammonia (NH_3), while that from acid solutions would be vitiated by hydrochloric acid (HCl).

Preparations of vegetable drugs generally contain larger or smaller amounts of *volatile acids.* The general rule, therefore, in the cases of all fluidextracts, tinctures, etc., is to distil from a solution made alkaline with caustic soda or potash. This serves to "fix" and retain volatile acids, and for the greater number of galenical preparations is the only precaution necessary to overcome difficulty No. 1.

On the other hand, preparations containing ammonia must be distilled only after the addition of an excess of sulphuric acid which serves to "fix" the ammonia in the form of ammonium sulphate. But, on the other hand, if the sulphuric acid serves also to liberate and thus render volatile any combined volatile acid, either directly from the drug extractive present or from a salt of ammonia such as ammonium chloride, then the first *distillate* must be rendered alkaline with caustic soda or potash and be redistilled.

When volatile oils and aromatics are present in galenical preparations in amounts only sufficient to flavor them, the vitiation of specific gravity in the distillate is so slight, that for the practical purpose of obtaining a figure which will comply with the requirements of the law as to declaration of alcoholic strength, it may be considered negligible. On the other hand, distillates from alcohol solutions of volatile oils, and from fluidextracts and tinctures of the volatile-oil-containing and oleoresin-containing drugs, often hold in solution or cloudy suspension such an amount of volatile oil as to decidedly vitiate the result. Spirit of anise, cinnamon, etc., and fluidextract of sandalwood, cubeb, capsicum, peppermint, etc., afford good examples of this class of preparations.

Here, obviation of the difficulty is aided by the fact that the alcoholic strength of such preparations is always high—thus enabling us to dilute the preparation with water, which throws out of solution a large percentage of the dissolved oil. One method of preparation for the distillation of such solutions consists in taking 25 c.c., diluting

with distilled water to 100 or 200 c.c., shaking with 1 to 5 Gm. of magnesium carbonate, kieselguhr, or purified talc, and filtering the solution into the distilling flask, washing the residue with enough distilled water to make the total volume of filtrate measure 150 or 250 c.c. All this must be done under conditions of care and low temperature to avoid loss of alcohol by evaporation. If the distillate after such treatment should still be cloudy from suspended oil, after dilution to the mark, it may be shaken with magnesium carbonate, filtered, and the specific gravity of the filtrate be taken as a basis for calculation of the alcoholic strength. A better method, however, and one which will also serve to eliminate the presence of the fourth class of interfering substances, namely ethereal solvents, will now be given.

The presence of ethereal solvents, such as ether and chloroform, offers by far the greatest difficulty to be overcome in determining the alcoholic strength of galenical preparations. To such an extent is this true, that in our laboratory we have surmounted the difficulty, so far as our own preparations are concerned, by going around it, as an Irishman might say. The declared alcoholic strengths of such preparations as contain ether, chloroform, and the like, are calculated from the formulæ, or, where this is not possible, from the determined alcoholic strength of the preparation or mixture at the stage just prior to the introduction of the ethereal solvent. Thus the necessity for an actual determination of the alcoholic strength of the finished preparation can often be obviated, but it still remains necessary to have a satisfactory method for the examination of such preparations from unknown sources. Especially is this necessary for the proper enforcement of the Food and Drugs Act by the Government authorities.

The following method, which has the endorsement of Dr. L. F. Kebler, Chief of the Division of Drugs of the Bureau of Chemistry at Washington is that of Thorpe and Holmes, and has been copied from the *Journal of the Chemical Society*, Vol. 83 (1903), page 314. It is the method employed in the British Government Laboratory.

Twenty-five cubic centimetres of the sample, measured at 60° F. (15.5° C.), are mixed with water in a separator to a bulk of from 100 to 150 c.c. and common salt is added in sufficient quantity to saturate the liquid. The mixture is now shaken vigorously for five minutes with from 50 to 80 c.c. of light petroleum, boiling below 60° C., and after standing for about half an hour the lower layer is drawn off into another separator, extracted if

necessary a second time with petroleum and then drawn off into a distillation flask. Meanwhile the petroleum layers are washed successively with 25 c.c. of saturated common salt solution, and the washings added to the main bulk, which is neutralized if necessary, and then distilled and the distillate made up to 100 c.c.

In the foregoing method it will be noted that the objectionable ether, chloroform, oils, etc., are removed before the sample is subjected to distillation. In the following method taken from the "Bericht der technischen Prüfungstelle des Reichsschatzamtes über technische Arbeiten auf dem Gebiete der Branntweinsteuer-Befreiungsordnung," for October 1, 1905, to September 30, 1907, the interfering substances are removed from the distillate. An outline of this method follows:

One hundred grammes of the preparation are mixed with 100 Gm. of water and distilled until about 150 Gm. of distillate have been obtained. The distillate is collected in a special "burette," the condenser rinsed with 10 c.c. of water which is added to the contents of the burette, and the united liquids shaken in the burette for three minutes with 50 c.c. of petroleum benzine of a boiling-point of from 160° to 180° and a gravity of from 0.785 to 0.790. After separation of the layers, the lower aqueous layer which contains the alcohol is run out into a 300 c.c. flask. The benzine layer in the burette is shaken out three times with 40 c.c. water and the aqueous washings added to the liquid in the flask.

The burette is next emptied and cleaned, and the united liquids in the flask returned to the burette, rinsing the flask out once with water into the burette. The contents are again shaken for three minutes with 30 c.c. of the petroleum benzine. Should the layers separate with more difficulty, the separation may be assisted by the introduction of some more water. After separation again, the lower aqueous layer is run off into a tared dry 300 c.c. flask, the residual liquid washed out twice more with 20 c.c. water, the washings returned to the flask, and the weight of the united liquids determined. By the addition of water, this weight is brought up to a round number. After shaking, and filtering through a dry filter, the alcoholic content of 100 Gm. is determined by means of an alcoholometer, and the amount calculated for the entire liquid, and hence for the 100 Gm. of original preparation taken.

Example: After distillation and treatment twice with petroleum benzine, the liquid weighs 236 Gm. It is brought up to 240 Gm. with water, shaken, filtered, and 30 Gm. of alcohol found in 100 Gm. by means of the alcoholometer.

$\frac{240 \times 30}{100} = 72$, the per cent. by weight of alcohol in the preparation.

We now come to the second great difficulty, namely, the mechanical or physical one, consisting in the tendency of the solution to

froth over or to carry non-volatile matter mechanically over into the distillate. Four things may be mentioned as means of overcoming this difficulty:

1. By careful regulation of the heat employed and the rate of distillation. For most galenical preparations, the heat should be so applied as to obtain a required 100 c.c. of distillate in from three-fourths to one and one-fourth hours.

2. By avoiding "bumping." This may be accomplished by the employment of broken glass, a few small pieces of platinum foil, a few pieces of "Siedesteinchen" (lumps of broken porous plates), or by suspending a string in such a manner as to have it dip slightly below the surface of the liquid.

3. By precipitating or coagulating by means of tannin or by means of lead subacetate, certain substances which tend to froth.

4. When all precautions fail to prevent frothing over, the redistillation of the distillate.

The following directions for making the alcohol determination of a pharmaceutical preparation by distillation will serve to describe the general method employed in our laboratory. Modifications of the described procedure must, of course, be made in accordance with the difficulties already mentioned.

Transfer exactly 50 c.c.[3] of the preparation (measured at any definite temperature, that of the room being most convenient) to a 500 c.c. distilling bulb of the round-bottomed variety, and 1 drachm of tannin in such a manner that none sticks to the neck of the flask at or above the delivery tube. Next add 5 to 10 c.c. of sodium hydroxide T. S., and 100 c.c. of distilled water. Rotate the flask until the contents are thoroughly mixed, and connect the flask with an upright Liebig's condenser, fitted with a spiral or worm condensing tube. The flask should be supported by means of a burette-clamp on a ring-stand, to which is also attached by means of an adjustable clamp a gas burner of the Argand type. This arrangement permits of a ready adjustment of the heat applied. Allow the lower end of the condenser tube to enter the neck of a 100 c.c. graduated flask, and around the mouth of the flask place a wad of cotton.

[3] It is better to take, of preparations containing

Up to 30 per cent. alcohol	100 c.c.
From 30 per cent. to 60 per cent. alcohol	75 c.c.
From 60 per cent. to 80 per cent. alcohol	50 c.c.
And above 80 per cent. alcohol	25 c.c.

Start the distillation, and so regulate the heat, keeping up a constant flow of cold water through the condenser, as to obtain nearly 100 c.c. of distillate in three-fourths to one and one-fourth hours.

Remove the receiving flask from the condenser, stopper it, cool or warm its contents to exactly the same temperature at which the original preparation was measured, and *at that temperature* dilute it to exactly 100 c.c. with distilled water. It may now be cooled, if it is desired to avoid calculations, to 15.6° C. or 25° C., according to convenience, and its specific gravity taken by means of a Westphal balance. Consult the U. S. P. alcohol tables, making any necessary corrections for temperature variations, and calculate the percentage of absolute alcohol by volume in the distillate. This figure multiplied by two gives the percentage of alcohol by volume in the original preparation.

Especial attention is called to the importance of obtaining exactly 100 c.c. of distillate at exactly the same temperature as that at which the original 50 c.c. of preparation was measured. A considerable error would be introduced, for example, by measuring the original preparation at 25° C., and adjusting the distillate at 100 c.c. at 15° C. On the other hand, the variation is negligible as between measuring both original preparation and distillate at 15° C. or measuring *both* at 25° C. Moreover, even if the 50 c.c. of original preparation were measured at 25° C. it matters not that the specific gravity of the distillate be taken at 15° C., provided that it was adjusted to 100 c.c. at 25° C. and was not again diluted to 100 c.c. after cooling to 15° C.

Having progressed more rapidly with the experiments looking to the elimination of the difficulty in the way of applying the wine method of alcohol determination, mentioned in the early part of this paper, in which the difference in gravity before and after evaporation of the alcohol and dilution to original volume with water is taken as the basis for calculation, I shall now briefly outline the experiments undertaken and tabulate the results, although so far few in number, that we have obtained.

It is scarcely necessary to repeat that the presence of easily volatile substances, such as ethereal solvents, absolutely precludes the use of this method. There remains, however, such a number of preparations, the alcoholic determinations of which are rendered difficult by frothing and bumping (example, fluidextract of sarsaparilla), together with an equally large number, the distillation

alcoholic determinations of which are vitiated by mechanically carried-over oils, etc. (examples, fluidextracts of cubeb, buchu, sandalwood, etc.), that it was deemed worth while to undertake to modify this "wine" method so as to make it applicable in these cases. Although by no means has a sufficient amount of work yet been done upon it to justify our concluding either to condemn or to laud the modified method, the results so far obtained are, to say the least, encouraging.

Theoretically, in the absence of substances other than alcohol, volatile at water-bath temperature, the method would work as well with a fluidextract or a tincture as with a wine, *provided only* that on dilution to original volume with water a clear solution results, the production of a clear solution, free from residue or precipitate, being essential to correctness of results. To insure such a final clear solution, therefore, I proposed to make the dilution with water, as in the regular method, wherever water would answer, but when it would not, to use instead a definite volume of an alcohol of suitable definite specific gravity.

In order to try out the proposed method approximately I selected as my experimental material a 25 per cent. aqueous solution of extract of taraxacum, for the reason that such a solution can be, theoretically at least, diluted with either water or alcohol without precipitation. From this was prepared, by mixture with definite volumes of U. S. P. alcohol (specific gravity 0.8106 at 22° C.) solutions A, B and C, containing respectively 25, 50 and 75 per cent. by volume of the above alcohol—these solutions being made up to the required volume in each case with the aqueous extract taraxacum solution, at the same temperature (22° C.). These solutions A, B and C respectively contained, therefore, theoretically (approximately) 23.75, 47.5 and 71.25 per cent. of absolute alcohol by volume.

The following directions were then carried out in the laboratory:

1. Determine alcohol (duplicates) by regular method by distillation.
2. Determine alcohol by regular "wine" method as follows (duplicates): Take specific gravity (Westphal) at definite temperature (Gr. No. 1).

Measure 50 c.c. in a pipette (at same temperature) which will discharge the exact amount of liquid necessary to fill a 50 c.c. cylinder to 50 c.c. mark, and transfer to a shallow capsule. Evaporate on water-bath until all alcohol has been dissipated. Transfer residue to the 50 c.c. cylinder and wash capsule and stirring rod with distilled water, into cylinder. Finally dilute to the mark with water with the solution at exactly same temperature, and take specific gravity (Westphal) (Gr. No. 2).

Calculation: Subtract specific gravity No. 1 from specific gravity No. 2 and subtract difference from 1,000. Consult tables for alcoholic strength of liquid of resulting specific gravity.

3. Repeat Experiment No. 2 with following modification:

Instead of diluting to 50 c.c. with water, transfer residue from capsule to cylinder with small amount of water and when at same temperature dilute to 25 c.c. with water at same temperature. Then add from a 25 c.c. pipette, exactly 25 c.c., exactly 95 per cent. alcohol at *same temperature*. Mix, adjust to exactly 50 c.c. with water and take specific gravity at *same temperature* (Gr. No. 2) (Westphal).

Calculation: Algebraically subtract specific gravity No. 1 from specific gravity No. 2 and subtract the algebraic difference from the specific gravity of 47.50 per cent. alcohol at *same temperature* (0.9392 at 15.6° C.). Consult tables.

4. Compare results of method 3 with those of methods 1 and 2.

The results obtained with the taraxacum solutions are now appended. They do not at all reflect the degree of care taken in obtaining them, and might be criticized as indicating a lack of care in making the determinations. At the risk, nevertheless, of their being thus criticized, they are given because they serve to bring out certain points of value.

Solution	Theoretical percentage (approximate)	Experiment No. 1 (distillation)	Experiment No. 2 "wine" method (dilution with water)	Experiment No. 3 modified method (Dilu. to dil. alc. strength)
A.....	23.75	21.28 21.10 Aver. 21.19 −2.56	24.10 24.10 Aver. 24.10 +0.35	21.40 21.80 Aver. 21.60 −2.15
B.....	47.50	46.00 46.20 Aver. 46.10 −1.40	46.73 Aver. 46.73 −0.77	48.42 47.42 Aver. 47.92 +0.42
C.....	71.25	71.00 70.86 Aver. 70.93 −0.32	72.23 72.30 Aver. 72.27 +1.02	71.97 71.38 Aver. 71.67 +0.42

In the above table, the figures marked + or — indicate the percentage above or below theoretical, of the average of duplicate determinations.

Attention is called to the fact that with the progressively more dilute solutions B and A in the case of Experiment No. 1, there goes

a corresponding increase in deviation from the theoretical. It is significant that in the case of Solution C results close to theory were obtained, while in the case of Solution A a deviation of more than 2.5 per cent. below theoretical was observed. This is undoubtedly due to the fact that in each case 50 c.c. were taken for the experiment, regardless of whether it was approximately 75, 50 or 25 per cent. in alcohol strength, and it is evident that when the distillation from a solution containing much extractive is continued for a considerable time after the alcohol has probably all been recovered, in order to get nearly 100 c.c. of distillate, sufficient non-alcoholic material is carried over, mechanically or otherwise, to considerably vitiate the result. The remedy for this difficulty is to work upon 100 c.c. instead of 50 c.c. in the case of solution A, and upon 75 c.c. instead of 50 c.c. in the case of solution B.

The results on Experiment No. 2 are not close, but withal are closer than by distillation.

Results on solution A in case of Experiment No. 3, which were subsequently repeated and confirmed, were inexplainably low, until I discovered that on dilution to 47.5 per cent. alcoholic strength a considerable amount of precipitation had occurred.. This completely accounts for the low results, since a precipitation of extractive would cause a lowering of specific gravity, which at that point would lower the final result.

The results on solution B, Experiment No. 3, show a wide variation in the "duplicates," thus illustrating the enormous "experimental" or "laboratory" error that it is difficult to avoid in making alcohol determinations.

The results on the taraxacum seeming to justify further experiments, it was next attempted to apply the modified method, described as Experiment No. 3, to fluidextracts of buchu, cubeb and sandalwood, which are among those preparations already enumerated as causing difficulty in the method by distillation. It was soon demonstrated, however, that a further modification of the modified method as already described would be necessary owing to the fact that it is impossible to transfer the residue, remaining after evaporating the alcohol from such preparations, from a dish to a measuring cylinder, with the aid of water alone.

After many experiments, the following procedure was adopted:

Fifty cubic centimetres of the preparation, measured at a definite temperature, are transferred (in portions if necessary) to a test-tube having an inside

diameter of 22 mm., a height of 200 mm., and being graduated at the point where it holds exactly 50 c.c. The test-tube is then placed in a water-bath and contents allowed to evaporate until all alcohol has been dissipated. After cooling to original temperature, U. S. P. alcohol (of known percentage of abs. alc. by volume), at the same temperature, is run in from a burette until an amount has been added which when diluted with water to exactly 50 c.c. will give a solution of approximately the same alcoholic strength as that used as menstruum for the preparation being worked upon. The test-tube is then stoppered, the contents thoroughly mixed (whereby a clear solution is obtained) and then the specific gravity of the solution determined, at the same temperature, by means of the Westphal balance.

Calculation: Algebraically subtract original specific gravity from that of the obtained solution, and subtract the algebraic difference from the theoretical specific gravity (at the same temperature) of alcohol of the theoretical strength obtained by the dilution. Consult tables.

Preparation	A. By Distillation	B. Thorpe and Holmes method	C. New modified method (in test-tube)
Fluidextract Buchu....	55.82 per cent.	49.08 per cent. 50.56 per cent.	56.10 per cent.
Fluidextract Cubeb....	70.15 per cent. 71.14 per cent.	.....	71.30 per cent.
Fluidextract Santal	79.60 per cent.	80.40 per cent. 82.00 per cent.	84.54 per cent.

The above table shows not only the results obtained by the foregoing procedure, but also results by distillation, and some results by the Thorpe and Holmes method.

Attention is called to the apparently low results obtained by both the distillation method and the Thorpe and Holmes method. It is hoped that others interested in alcohol determinations will also try the modified wine method, so called, and report their results.

In conclusion, attention is called to the possibility of determining the alcoholic strength of the final distillate by means other than that afforded by the Westphal balance:

First, by other means of determining the specific gravity. Dr. A. B. Lyons, in a paper presented to the Scientific Section of the A. Ph. A. at the Hot Springs meeting, described a method in which, by simply weighing the distillate in a special pycnometer, and consulting tables, the alcoholic content of the original preparation, at various temperatures, could be read off directly. Inasmuch as the paper did not attempt to provide means of eliminating the difficulties

incident to the distillation, and as it would undoubtedly, for most operators, consume as much (if not more) time to properly fill and weigh a pycnometer as it would to take the specific gravity by means of the Westphal balance and make the necessary calculations, Dr. Lyons's method, as a time-saver, is of problematic value. Moreover, the method has the additional drawback of requiring specially constructed pycnometers for use in various altitudes, on account of differences in barometric pressure.

Second, by means of the refractive index. The Zeiss immersion refractometer has been proposed and used as a means of determining the alcoholic content of the final distillate. Inasmuch, however, as many of the same substances which are liable to contaminate the distillate and which cause a vitiation of the specific gravity will also cause a vitiation of the refractive index, the method does not offer any special advantages in the general laboratory. The immersion refractometer, however, may be employed to great advantage in determining the relative proportions of ethyl and methyl alcohols in denatured alcohol, for which see Herrick's " Denatured or Industrial Alcohol," pp. 145–157.

Finally, I desire to express my thanks to Mr. L. Henry Bernegau and Mr. Fritz Heidlberg for valuable suggestions as well as for the carrying out of the determinations and experiments described in this paper.

Analytic Laboratory of the
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PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert, Washington, D. C.

From a pharmaceutical point of view, or, rather, from the point of view of one interested in the progress of pharmacy as a science, the most important happening during the past three months was the initial session of the *section on pharmaceutical chemistry* that was held in connection with the *thirty-ninth general meeting of the American Chemical Society,* held in Baltimore, during Convocation Week.

The meeting itself was probably the most successful, best attended, most interesting and most promising meeting that the American Chemical Society has ever held and the enthusiasm that was manifested in connection with the sessions of the several divisions and sections could not be otherwise than encouraging to the members of the society who were more directly interested in pharmaceutical chemistry, and their enthusiasm, in turn, manifested itself in a resolution expressing their desire for a continued independent existence and their preference for the ultimate formation of a Division on Pharmaceutical Chemistry.

It is quite probable that such a division will be organized at the coming meeting of the American Chemical Society, in Detroit next June, and, when formed, it will surely mark a distinct advance in the progress of American pharmacy.

There can be no gainsaying the fact that pharmacy, particularly the science of pharmacy, is closely related to, and in many respects dependent on, the progress that is made in other sciences; and the efforts that have been made in the past to encourage the pharmacist in holding aloof from scientific organizations devoted more specifically to the development of other lines of work have been unfortunate in that they have really hampered the progress of pharmacy rather than concentrated the energies of its votaries to aid in its advancement.

Of the many scientific organizations, in this country, that are deserving of the support of the pharmacist, few if any compare, in possible returns, with the American Chemical Society. This society now has upwards of three thousand members, all of them intensely interested in some one phase of the science of chemistry, and the society itself is an excellent illustration of the possibility of having general meetings, with simultaneous sessions devoted to the reading and discussion of scientific papers, ample time for meeting the members in a social way, and practically no time wasted on the consideration of the more purely administrative business of the society, which is delegated to the Council. As an object lesson alone, attendance at a meeting of the American Chemical Society would be of value to American pharmacists, and, particularly, to the more active members of the American Pharmaceutical Association.

With the formation of a division on pharmaceutical chemistry the American Chemical Society should become more than ever an attraction for pharmacists who are interested in the science of their

calling, but, even at the present time, the publications of the society alone should be a sufficient inducement for the up-to-date pharmacist to seek membership in its ranks. The newly established *Journal of Industrial and Engineering Chemistry* is devoted to the more practical side of chemistry, while the *Abstract Journal* covers practically all of the available chemical literature.

The Convocation Week meeting of the American Association for the Advancement of Science was held in Baltimore from December 26 to January 2. It is generally conceded that this meeting has never been equalled either in size or importance by any gathering of scientific men in this country. The program that was issued included upwards of one thousand titles of papers that were to be read at the meeting.

In matters pharmacopœial the more interesting publication is the new, *Ninth, edition of the Swedish Pharmacopœia, Svenska Farmakopen,* 1909. The eighth edition of the *Swedish Pharmacopœia,* it will be remembered, was published in 1902, just before the meeting of the International Conference, in Brussels. The provisions of that conference were considered to be of such importance that the Revision Committee decided to revise the entire work so as to bring it thoroughly up to date.

The comments that have appeared in European pharmaceutical journals on this new *Swedish Pharmacopœia* are uniformly favorable and it would appear as though the Revision Committee had been successful in preparing a book that is both compact and comprehensive.

The *British Pharmacopœia* is now in active course of revision and, judging from the interest that is being manifested in the making of the book, by both the medical and pharmaceutical professions, it will be thoroughly up to date and will accurately represent the present-day advances in materia medica.

From the available comments on the coming revision of the *British Pharmacopœia,* it would appear that Dr. Dixon and his colleagues advocate a volume which will deal only with medicaments of proved virtue and will include a minimum number of the preparations of those drugs (*Pharm. Jour.,* London).

The *British Pharmaceutical Codex* has been out of print for several months but is now in press, and the revisers promise that the book will meet all expectations. In addition to the matter included in the first edition the re-issue will include information

regarding many other drugs, chemicals and galenical preparations which have come into prominence during the past twelve months or more.

Codex Notes is the title applied by A. D. Watson to a collection of comments on the *British Pharmaceutical Codex,* in the course of which he makes sundry recommendations regarding the book and the possibility of improving it. He points out, among other features, that the book is the property of the druggists of Great Britain and that it is both their interest and their duty to make it as widely known and used as possible.

He also suggests adopting the arrangement of the subjects followed in Squire's *Companion to the Pharmacopœia.*

A new edition of the booklet, now a book, entitled *The Propaganda for Reform in Proprietary Medicine,* has been published by the American Medical Association. The book now comprises nearly three hundred pages of material, reprinted from the *Journal of the American Medical Association,* and, to the pharmacist particularly, should be worth many times the price that is asked for it. For those who wish to have the material in more permanent form a cloth bound edition has been prepared, and this will no doubt be an advantage because of its more presentable appearance and the permanent character of the binding.

Therapeutic Progress.—Every wide-awake pharmacist should read and mentally digest the address delivered at the opening session of the Department of Medicine and Surgery of the University of Michigan, by Dr. C. W. Edmunds. In this address Dr. Edmunds has gathered together an array of facts that will serve to attract attention to a number of abuses that serve to still further complicate "the complex character of the present-day therapeutic situation." This address is printed in full in the *Journal of the American Medical Association* (1909, v. 52, pp. 519–524).

The Annual Meetings.—Active preparations are being made for the coming meetings of the several National associations in which retail druggists are more or less interested. The Council of the American Pharmaceutical Association has decided to accept the invitation of the retail druggists of Los Angeles and the meeting of the A. Ph. A. will probably be held in that city some time in August.

While there are, no doubt, many members of the American Pharmaceutical Association who honestly doubt the judiciousness of this decision, particularly in view of the really warm experience

in the southwest last September, there can be no doubt of the sincerity of members of the American Pharmaceutical Association to make the best of the situation and secure as large a delegation as possible to attend the meeting in Los Angeles.

The National Association of Retail Druggists has decided to meet in Louisville, Ky., the first week in September and is not alone assured of a hearty welcome, but, also, a record-breaking attendance.

An editorial in the *Journal of the American Medical Association* (1909, v. 52, p. 562) discusses the *report of the referee board on sodium benzoate,* from the point of view of the average intelligent citizen who is interested in getting value for value and, incidentally at least, in conserving his own health and the health of those dependent on him. In this editorial it is made plain that the several questions reported on by the referee board do not alter or even involve the real question at issue: the use of chemical preservatives to hide the indiscriminate use of partially decomposed food materials.

Gelatin Capsules.—F. Lorenzen has examined a number of gelatin capsules containing extract of male fern and finds that they vary in weight from 0.8 to 1.08 Gm.; the weight of the empty capsule varied from 0.29 to 0.49 Gm. and the content varied from 0.50 to 0.64 in place of 0.55 Gm. claimed by the manufacturer.—*Apoth. Ztg.,* Berlin, 1908, v. 23, p. 899.

The Java Cinchona Plantations.—The *British and Colonial Druggist* (1909, v. 55, p. 7) contains an illustrated article descriptive of the introduction of cinchona into Java and gives some account of the military pharmacists who were interested in the cultivation of this plant and have supervised the government plantations.

Cinchona Assay.—Dr. N. H. Cohen (*Pharm. Weekbld.,* 1907) has devised a modification of the assay process for cinchona bark, in which the powdered bark is extracted by means of ether, heated in a reflux condenser; the mixture, after cooling, is made alkaline with soda solution. The ethereal solution is subsequently treated with lime water and the ethereal layer finally evaporated and the alkaloid dried and weighed.—*Pharm. Zentralb.,* 1908, v. 50, p. 1025.

Coca and Cocaine.—An interesting historical study of coca and its chief alkaloid is printed in a recent number of the *Pharmaceutical Journal* (1909, v. 28, pp. 28–30). Dating back to the early history of Peru the story of this drug is traced chronologically, with many interesting quotations, up to the present time.

Scopola.—G. Weigel points out that there is a marked difference

between the rhizome of the European *Scopola carniolica* and that of the Japanese variety *Scopola japonica.* There is a distinct structural difference between the two drugs, the Japanese root being the larger and somewhat lighter in color. The Japanese root, too, contains only about one-half the amount of alkaloid contained in the European root.—*Pharm. Zentralb.,* 1908, v. 50, p. 516.

Sugar.—The per capita consumption of sugar in the United States was 77.54 pounds in 1907, which exceeds that of any previous year, the total amount of refined sugar amounting to 2,843,928 long tons against 2,760,343 long tons produced in 1906.—*J. Ind. and Eng. Chem.,* 1909, v. 1, p. 3.

False Senega.—C. Hartwich (*Schweiz. Wochenschr. f. Chem. u. Pharm.,* 1908, v. 46, pp. 537 and 749) calls attention to two samples of false senega that have been brought to his notice within a short time. He describes the macroscopic as well as the microscopic characteristics of the root and calls attention to the absence of the characteristic keel of the true senega in one of the samples, while in the other an eccentric formation of the several structures occasionally simulates the keel of the true drug.—*Apoth. Ztg.,* 1908, v. 23, pp. 906–907.

Ergot Oil.—A. Rothje has studied the physical and chemical properties of the oil extracted from ergot by ether. He finds that the oil has a specific gravity of 0.925, a refraction index of 1.4685, a saponification value of 178.4 to 180.2, an acid value of 73.4 to 74.5, and contains 7.9 to 8.1 per cent. of glycerin, 0.36 per cent. of unsaponifiable matter and 0.2 per cent. of ash.—*Pharm. Jour.,* London, 1909, v. 28, p 32. from *Arch. d. Pharm.*

South African Oil of Eucalyptus.—E. F. Harrison has examined a sample of this oil from the Transvaal. The cineol content was 83.7 per cent., the specific gravity 0.9227 at 15.5° C. and gave a negative test for phellandrene.—*Pharm. Jour.,* London, 1909, v. 28, p. 4.

Berté and Romeo, commenting on the characters and tests given in the U. S. P. VIII, for *oil of lemon,* say that the minimum limit for specific gravity at 25° C. should be 0.849 and the minimum figure for optical rotation +58°. As regards the difference in optical rotation of the first 10 per cent. of distillate and that of the original oil, the limit of 2° should be extended to 4° or 5°. Berté and Romeo did not get satisfactory results with the method given for the determination of citral owing to the difficulty of observing the neutral

point in the titration.—*Chem. and Drug.*, London, 1909, v. 74, p. 81.

The manufacture of oil of lemon and citrate of lime in Sicily is the subject of an exhaustive paper by E. M. Chace who made a personal investigation of the conditions prevailing in Sicily at the time of his visit. The article is illustrated and is particularly interesting at this time as being descriptive of the conditions prevailing in Sicily before the recent catastrophe in the citrus district.—*Jour. of Industr. and Eng. Chem.*, 1909, v. 1, p. 25.

Lemon Scented Bay.—An abstract (from *West Ind. Bull.*, v. 9, pp. 265–276) describes a variety of "bay" known as *Pigmenta acris var citrifolia* or lemon scented bay, which yields an oil that has a distinct lemon-like odor, with a secondary odor resembling that of phenylisocyanide.—*Pharm. Jour.*, London, 1909, v. 28, p. 6.

New Adulterant of Lavender Oil.—J. Delphin points out that the esters of the fatty acids of cocoa-nut oil have been detected as being added to lavender oil of poor quality. These cocoa-nut esters lend themselves well to this fraudulent application since the saponification value is very high, so that only a very slight addition is necessary to greatly "improve" the ester value of the oil.—*Pharm. Jour.*, London, 1909, v. 28, p. 60. (From *Svensk farm. Tidskr.*)

Turpentine and its Adulterants.—Arthur E. Paul discusses the production of turpentine and the characteristics of the oil distilled from it. He also describes "wood turpentine," also known as "stump" turpentine, steamed wood turpentine and wood pulp turpentine. As these products are but slightly below turpentine in price it follows that as a commercial adulterant they would have to be used in large quantities to be profitable. Among the more common adulterants he enumerates the several petroleum products and turpentine substitutes.—*Jour. of Industr. and Eng. Chem.*, 1909, v. 1, pp. 27–31.

Toxicity of Bismuth Subnitrate.—The toxicity of this substance is discussed by Emil G. Beck, who reviews the literature and concludes that bismuth subnitrate administered by stomach in small doses is harmless. When given in large doses, by mouth, or, more particularly, when injected by rectum, bismuth subnitrate may liberate nitrites which may, in turn, cause poisoning.—*Jour. Am. M. Assoc.*, Chicago, 1909, v. 52, pp. 14–18.

Mercurous nitrate as a microchemical reagent for arsenic has been recommended by G. Deniges, who dissolves mercurous nitrate

by means of nitric acid and adds this solution to a nitric-acid solution of the suspected material previously treated with ammonia.—*Compt. Rend.*, v. 147, pp. 744–745.

Mercury Sozo-iodolate.—W. A. Puckner points out that a solution of mercury sozo-iodolate which was submitted for examination contained sodium and mercury as the essential ingredients, the mercury sozo-iodolate being soluble in solutions of iodides, bromides or chlorides. From an estimation of the mercury, the sodium and the iodine, he concludes that 100 c.c. of the solution contained approximately one gramme of mercury sozo-iodolate and somewhat less than 3 grammes of sodium iodide, so that it would represent the activity of approximately 0.8 gramme of mercuric iodide and 3 grammes of sodium iodide.—*Jour. Am. M. Assoc.*, 1909, v. 52, p. 574.

The permanency of permanganate solutions has been further investigated by J. W. Hammer (*Svensk. farm. Tidskr.*), who found that after the destruction of the organic matter in the water or on the walls of the container the undecomposed portion of the solution is indefinitely permanent, so that a titrimetric solution which is preserved from light and contamination may be used indefinitely.—*Pharm. Zentralb.*, 1908, v. 50, p. 1023.

Zinc Permanganate.—An examination of zinc permanganate made in the chemical laboratory of the American Medical Association showed that the commercial product varied from 72 to 97 per cent. pure. Tablets of zinc permanganate were examined and found to contain from 86 to 89 per cent. of the amount claimed by the manufacturer.—*Jour. Am. M. Assoc.*, 1909, v. 52, pp. 488–489.

Nickel Culinary Utensils.—The harmlessness of nickel cooking utensils has been demonstrated by two Russian investigators who studied the solvent action of such fluids as are likely to come in contact with the metal, and the probable ill effects of the resulting solutions of nickel on the animal organism. Their results appear to indicate that when taken for a long period of time in doses much larger than can be derived from nickel cooking vessels the metal and its salts are quite devoid of harmful effects.—Abstract in *Pharm. Jour.*, London, 1909, v. 28, p. 6.

Methyl Red as an Indicator of Extreme Delicacy.—Rupp and Loose (*Berichte*, 1908, p. 3905) recommend the use of methyl red as an indicator of great delicacy with $^1/_{100}$ N. solutions. Methyl red is defined as an azo combination of *o*-amidobenzoic acid and

dimethylaniline. In alkaline and neutral solutions it has a pale yellow color and in acid solutions a violet red.—*Pharm. Jour.*, London, 1909, v. 28, p. 6.

Aloesol is the name that has been given to a complex phenol, obtained by E. Léger, as one of the products of the action of potassium chlorate and hydrochloric acid on cape aloes. The product occurs as a tetrachlor derivative that is almost insoluble in water or in alcohol and only slightly soluble in dilute solutions of the alkalies. —*Compt. Rend.*, 1908, v. 147, pp. 806–808.

Anusol suppositories were examined by J. F. Suyver who found that they contained neither iodine nor sulphonated resorcin, or, in other words, that anusol suppositories contain no anusol, which the manufacturers claim to be an iodized resorcin sulphonate of bismuth.—*Apoth. Ztg.*, 1908, pp. 863–864 from *Pharm. Weekbl.*

Helkomen.—This is claimed to be a basic bismuth dibromate oxynaphthoate. It has been examined by F. Zernik who found it to contain 72.88 per cent. of bismuth and 19.57 per cent. of bromine, and concludes that the product represents a much more basic combination than is indicated by the evidently misleading formula published by the manufacturers of helkomen.—*Apoth. Ztg.*, Berlin, 1909, v. 23, p. 898.

Hordenine is said to be para-ethylphenylethyldimethylamine. The sulphate of this compound crystallizes in needles and has a slightly bitter taste; its aqueous solution may be sterilized at 120° C. One milligramme per kilo is said to have a tonic action on the heart, but toxic doses (1 to 2 grammes per kilo) produce the reverse effect by suspending the activity of the pneumogastric nerve.—*Jour. Soc. Chem. Ind.*, 1909, v. 28, p. 38.

Iodomenin was examined by F. Zernik who found it to contain, as claimed, bismuth albumin and iodine. The amount of iodine present corresponded practically to the claim made for it by the manufacturer.—*Apoth. Ztg.*, Berlin, 1908, v. 23, pp. 871–872.

Iodoval is described as *a*-mono-iodo-iso-valerianyl-urea that occurs as white needles having a melting point of 180° C. It is recommended for the administration of iodine as substitute for the iodides. It may be given in doses of 0.30 three times daily, in powder form or in tablets.—*Pharm. Jour.*, London, 1909, v. 28, p. 86.

Propäsin is the proprietary name for the propyl ester of paramidobenzoic acid. It occurs as white crystals with a faintly alkaline

reaction melting at 73° to 74° C., sparingly soluble in organic solvents and in fats. It is recommended as a non-toxic local anæsthetic to the mucous membrane.

Dipropäsin is an odorless and tasteless white powder, melting at 171° to 172° C., insoluble in water, readily soluble in other liquids, but only sparingly soluble in other liquids. It is decomposed by alkaline solutions or secretions liberating the anæsthetic propäsin.—*Pharm. Jour.*, London, 1909, v. 28, p. 86.

Strophanthus.—H. Beckurts discusses the sulphuric acid test for strophanthus and points out that 75 per cent. sulphuric acid, with comparatively thin, transverse sections of the seed will give most uniformly satisfactory results.—*Apoth. Ztg.*, 1908, v. 23, pp. 921–922.

Synthetic Suprarenin.—Krausz (*Apoth. Ztg.*, 1908, v. 23, p. 701) enumerates a number of tests and reactions for the alkaloid of the suprarenal gland and the synthetic product that is now being marketed.

Synthetic suprarenin is now being made identical in every respect with the natural substance. Formerly the synthetic preparation was optically inactive, owing to its consisting of a mixture of dextro- and lævorotatory suprarenin, the former being therapeutically inactive. It has now been found possible to separate the two forms and the synthetic suprarenin bids fair to surpass the natural product in efficiency.—F. Flächer, abstract from *Ztschr. f. Physiol. Chem.* in *Pharm. Jour.*, London, 1909, v. 28, p. 27.

Cushny reports on the action of the pure, lævorotatory suprarenin which he finds to be equal in power to the natural product, while the dextrorotatory suprarenin was found to be much weaker. While it is difficult to obtain the exact relative strength of the two bodies, it appears to require more than ten times as much dextrosuprarenin as lævosuprarenin to raise the blood-pressure to a definite point.—*Pharm. Jour.*, London, 1909, v. 28, p. 56.

BOOK REVIEWS.

GESCHICHTE DER PHARMAZIE. By Dr. Hermann Schelenz. Verlag von Julius Springer, Berlin.

Every science has its history and many historical works have been published, for instance, "A History of Chemistry" by Ernst von Meyer, translated into English by George McGowan, which is of special interest to the pharmacist.

But our dear old "Mater Pharmacia" has been treated somewhat step-motherly until after ten years' work the well-known German author, historian and, we are proud to state, apotheker, Hermann Schelenz, Cassel, published a master-work in his "History of Pharmacy."

In this excellent book of about 1000 pages Schelenz gives the history of pharmacy of all nations from the oldest times to the present day, divided into nineteen periods.

Schelenz gives the history of the various drugs, their cultivation, marketing and even adulterations. The history of galenical preparations is not only traced to Claudius Galenus, but even to Dioscorides. Etymology, that important and interesting study of the origin and derivation of the names of drugs, in fact of all names connected with pharmacy, is one of Schelenz's specialties.

The history of nostrums and the development of the nostrum evil are not forgotten in this book.

Furthermore, Schelenz gives the biographies of celebrated pharmacists, botanists and pharmacognosists, alchemists and chemists, physicians and pharmacologists. We find in this work the history of the Pharmacopœias, Dispensatories and Formularies of all nations, also pharmaceutical laws and price-taxes.

Schelenz gives a review of pharmaceutical literature and journals, also the history of the universities; and allied sciences from the earliest times to the present day.

A 5-page list of scentific reference works which have been consulted by the author, and a very complete index of 100 pages and containing 26,000 words, conclude the book.

Schelenz's "Geschichte der Pharmazie" is just the book to awaken in the young pharmacist, the apprentice and the student a love for his work and studies, and it is also well suited to strengthen the love for his profession in the pharmacist and apothecary. Let

us hope that this valuable book will be translated into English, so it will have a still larger circulation.

Schelenz's "History of Pharmacy" ought to be a reference book, if not a text-book, in our pharmaceutical schools, and although this is an age of commercialism, nevertheless pharmaceutical history should be included in the curriculum of our colleges.

OTTO RAUBENHEIMER.

CORRESPONDENCE.

DISCUSSION ON FORMULAS FOR MEDICINES WHICH MAY BE DISPENSED BY PHARMACISTS.

[In a lecture by Dr. H. W. Wiley, delivered recently at the Philadelphia College of Pharmacy (see AMERICAN JOURNAL OF PHARMACY, February, 1909), he says: "The pharmacist must in some cases exercise the functions of a physician and the physician to some extent those of the pharmacist," and following in the line of the suggestion made by Dr. McCormack a year ago he stated "that for the minor diseases, for which the druggist may safely prescribe, it would be sufficient for the medical fraternity in each locality to agree with the druggist in regard to remedies which should be given for simple colds and other minor diseases."

Inasmuch as this suggestion has been made on two different occasions it seems desirable to take it up and discuss it. It is proposed to take up the discussion of this subject at the Pharmaceutical Meeting in March and it is hoped that the following communications which have been received will stimulate the discussion of this subject.]

TO THE EDITOR OF THE AMERICAN JOURNAL OF PHARMACY:

In his lecture published in your February number Dr. H. W. Wiley touched upon some of the most serious difficulties which at present beset the pharmacist in his struggle for existence. He referred to the extremely unsatisfactory standards of education for pharmacy, "the great evil of the patent medicine habit," the shaken faith in the virtue of drugs, the spread of various forms of drugless treatment of disease, and the contentions between physicians and pharmacists.

Dr. Wiley's prediction that the preliminary education required for pharmacy will advance until the degree of A.B. or its equivalent is demanded is too optimistic. High school graduation is required in all other countries and South Dakota has shown that it is attain-

able in the United States; but it will be a long time before more can be done.

The quack nostrum traffic should be stamped out for the protection of the public, and druggists who encourage it for the sake of the commission they receive are not only doing injury to their fellowmen but at the same time selling their birthright for a mess of pottage.

The remarkable spread of the belief in drugless treatment of disease is but the reaction against the insane abuse of drugs. The cure for it is real investigation and education. No person should be permitted to endanger health and life by undertaking the diagnosis and treatment of disease who does not possess an adequate knowledge of the human body, its organization and structure, and its disorders, and of medical chemistry. Such a knowledge cannot be attained without systematic training and clinical study. If mental healing cannot stand the test of special knowledge, truth and experience, it must be false. Let it be subjected to that test.

There is but little or no danger of jealousy or contention between physicians and pharmacists of education and high moral character. The ignorant, venal and selfish will always make and have trouble.

It is quite true that the physician must in these days carry certain important remedies in his office or his hand bag in convenient form for immediate use in order to better serve his patients, and the pharmacist cannot object to it without discredit to himself. The pharmacist must be permitted to dispense many simple and comparatively harmless remedies commonly called for by persons who do not need or who think they do not need the advice of a physician. A conscientious, high-minded physician will neither knowingly patronize an incompetent or faithless pharmacist nor will he undertake to perform the duties of the pharmacist himself. A conscientious high-minded pharmacist will not perform any functions belonging to the physician.

By all means let local physicians and pharmacists get together and agree upon the course each should take and upon what remedies the pharmacists might dispense without a physician's prescription to satisfy reasonable demands which the public will surely continue to make upon them and which it is better to satisfy than to refuse. A beginning might appropriately be made in cities where local branches of the American Pharmaceutical Association exist.

Yours truly,

OSCAR OLDBERG.

EDITOR, AMERICAN JOURNAL OF PHARMACY:

When I first read Dr. Wiley's lecture, I felt that he was a veritable Daniel come to judgment, but when I considered the subject in detail as it would have to be worked out, my spirits fell, and I had to conclude that in the present state of the public mind it would only be possible to carry out his plan to a very limited extent. His suggestion certainly is fascinating to the physician and hyper-ethical pharmacist, but I fear there are very few communities in which it could be carried out. There are not many localities in which druggists and doctors could come to such an agreement as would be necessary to make it a success. As an ideal, however, it is something good to work up to, but as a practical measure for general adoption at the present time I fear it is not feasible.

To carry out such a plan, the concurrence of four parties is necessary; these are: (1) the doctors, (2) the druggists, (3) the great American public, and (4) the patent medicine proprietors. If we assume that the first two are able to come to an agreement that would render Wiley's plan feasible, we still have the other two parties to deal with. The patent medicine proprietors have vast sums of money invested in their products, and they would not consent to let their capital be dissipated and in some cases themselves ruined for the sake of carrying out an idea with which they have no sympathy. They would surely make more strenuous efforts than ever to create a demand for their goods, and the great American public would exercise their right to choose between the remedies advertised by the patent medicine men and those put forward by druggists. Comparing the flaming advertisements of "cures," with the modest recommendations by druggists of medicines to "relieve," the choice would almost always be in favor of the former. And so in the majority of cases the ethical preparations would remain unsold.

But suppose the druggists should discontinue to sell the patent medicines, what would happen? Surely somebody would sell them. The proprietors would find some means of marketing their goods. With the public calling for them and proprietors pushing them, the sale would go on. It is quite likely that such action by druggists would hurt the sale of these "patents" and perhaps after many years almost kill it, but no one can now foresee what the effect would be, nor how long it would be before any marked effect would be produced.

Again, supposing that druggists did resolve to throw patent medicines out of their business, where would they draw the line? Nothing short of a joint commission of doctors and druggists could settle this point, and they would probably never come to an agreement. Some of these very physicians who would be the most enthusiastic over Dr. Wiley's plan, would continue to prescribe some of the "patents" which the druggists had been induced to throw out, and there would be dissatisfaction all around.

In fact, I am obliged to admit that Dr. Wiley's roseate plan is in advance of the times. Many physicians are not ready for it, more druggists would fail to endorse it, and the great American public would have none of it. All these three classes of persons need to be educated up to it. In the present state of public sentiment, I do not see how it could be worked.

W. M. SEARBY.

MY DEAR PROF. KRAEMER:

Replying to your esteemed favor of Jan. 30th, would state that I had read the abstract of lecture delivered by Dr. Wiley at the Philadelphia College of Pharmacy and noted with considerable interest the suggestions he made about retail druggists handling domestic remedies compounded from prescriptions furnished by the local medical association.

The recommendation of patent or proprietary medicines by retail druggists is more a force of habit than otherwise. If you were to ask one why he recommended that particular remedy he would probably reply, "Oh, I don't know why, unless it was to get rid of some old stock." What we are endeavoring to teach the druggist to say, when a patron comes in his store and asks for a specific patent medicine and also the question "Is it any good?" is, "Now, you know just as much about that as we do. It is extensively advertised and has a sale, but I am entirely ignorant of its contents, etc."

This would be only telling the absolute truth and would be apt to gain the confidence of his customer did he not go further and say, "Here is something I can recommend to you which is just as good or better," and probably be just as ignorant of its contents as he was on the first article.

This applies more particularly to a later class of remedies called non-secret preparations. How in the world the average retail

druggist can be gulled by the sophistry of these preparations is beyond me. In fact his only argument is that he can buy them cheaper than ordinary proprietaries and therefore makes more profit. It has often been said that the American people like to be gulled. It does seem so.

The proprietors of a patent medicine put out a flaming advertisement covering all the ills that flesh is heir to or ever expects to be. They are generally written in such a measure that the average person is led to believe that he or she has just that disease. I regret to say that some retail druggists apparently believe the same thing, especially if there is a good margin of profit upon the medicine in question.

Now, as to the suggestion of Dr. Wiley, I think it would be far more practicable and more apt to meet with the approval of the druggists did we reverse the order of doing. For instance, every retailer is interested in getting up for ready sale those medicines which are the best for the purposes indicated and then again you must take into consideration the fact that each one thinks he has the best, etc.

Now, it follows that if the local medical association were to write general prescriptions for this class of remedies, each druggist would have similar preparations, whereas could there be an agreement whereby the druggist could submit his preparation and formula to the local medical association for censorship and approval, then you would have something tangible.

For instance, the Philadelphia County Medical Society could have a committee similar to the Council of Pharmacy and Chemistry of the American Medical Association to whom, at stated periods, these formulas could be submitted and if they were approved could be dispensed, and how easy and ethical it would be for the druggist to say, "Here is a remedy for a cough that has been approved by the County Medical Association and I can truthfully recommend it."

If this plan could be made possible and practical, I can see the whole group of popular headache remedies go flying in the air. In my belief the time is coming when the physician and pharmacist are going to get together upon a common basis and when it does come you will see pharmacy restored to where it properly belongs.

T. H. Potts.